SUMMARY

Twelve pregnant pony mares were assigned to a control (N=7) and treatment group (N=5). Treatment consisted of daily intramuscular injections of saline or 100 mg dexamethasone from day 321 through 324 or until parturition, whichever occurred first. Dexamethasone treatment significantly shortened gestation (P<.01). The mean length of gestation ± SE and range in days were, respectively: control mares 334.4 ± 1.2, 322 to 344 and dexamethasone-treated mares 324 ± .1, 323 to 325. All 12 foals were born live and normal in appearance; every mother lactated and produced sufficient milk to raise her foals. Twelve pony mares ovariectomized on day 140 or 210 of gestation were assigned randomly in equal numbers before the beginning of the experiment to a control and treatment group. Treatment consisted of daily intramuscular injections of 100 mg dexamethasone from day 321 through 324 of gestation. The mean length of gestation ± SE and range in days were, respectively, 323.6 ± 5.6, 305 to 338 for control mares and 326.8 ± 5, 324 to 331 for mares treated with dexamethasone. Although the means were not significantly different, dexamethasone treatment did reduce the range and variance in gestation. Four of the six treated mares foaled within the same time interval as the dexamethasone-treated mares in the first experiment suggesting that dexamethasone can induce parturition in ovariectomized mares. There was no significant difference between control and treated mares in birth weight, the presence of milk after parturition or the frequency of live birth.

(Key Words: Equine, Parturition, Dexamethasone, Ovariectomy.)

INTRODUCTION

Parturition has been successfully induced in large saddle type mares by a treatment regime consisting of 100 mg of dexamethasone per day for 4 days (Alm et al., 1974, 1975). However, parturition has not been successfully induced in pony mares. Single or low doses of dexamethasone did not induce parturition (Campbell, 1971; Drost, 1972; Burns, 1973). Rossdale and Jeffcott (1975) attempted to induce parturition in three pony mares, at a late stage of gestation, when the mares exhibited moderate to substantial mammary development. They observed retained placentas in three and dystocia and stillbirth from two after each received four daily injections of 100 mg of dexamethasone. The mode of action of dexamethasone in causing premature birth in the equine is unknown. Maternal ovaries may be necessary for glucocorticoids to induce a normal parturition. Ovariectomy does not terminate pregnancy if performed after day 70 of gestation (Holtan et al., 1975).

Experiment I was designed to test the hypothesis that parturition can be induced in pony mares by repeated administration of high doses of dexamethasone. Experiment II was conducted to determine whether maternal ovaries must be present for parturition to be induced by dexamethasone and whether ovariectomy and dexamethasone treatment affect normal delivery of a live foal or initiation of lactation.

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INDUCED PARTURITION IN MARES

TABLE 1. THE EFFECT OF DEXAMETHASONE ON LENGTH OF GESTATION, PLACENTAL EXPULSION, AND DELIVERY OF LIVE FOALS BY PONY MARES

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mares (no.)</th>
<th>Gestation (days)</th>
<th>Placenta expelled in less than 1 day (no.)</th>
<th>Live birth (no.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>7</td>
<td>334.4 ± 1.2**</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>5</td>
<td>324.0 ± .1</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

*100 mg dexamethasone/day on days 321 to foaling.

**Mean ± SE.

**Means and variances differ, P<.01.

MATERIALS AND METHODS

Experiment I. Twelve pregnant Shetland type pony mares, weighing approximately 210 kg each, were assigned randomly through five replicates to two treatment groups. A mistake in assignment of the last mare resulted in unequal numbers receiving each treatment. Seven mares received intramuscular injections of 50 ml of saline, and five received 50 ml of Azium\(^5\) (100 mg dexamethasone) on days 321 through 324 of gestation or until parturition, whichever occurred first. All mares were observed once per day for birth of foal, live status of the foal and placental expulsion. Data on length of gestation were analyzed by Bartlett's test and by analysis of variance (Snedecor and Cochran, 1967).

Experiment II. Twelve pregnant Shetland type pony mares, weighing approximately 200 kg each, which had been ovariectomized on day 140 or 210 of gestation were assigned randomly in equal numbers to receive no treatment (controls) or daily intramuscular injections of 100 mg dexamethasone (Azium) on days 321 through 324 of gestation. All mares were observed daily for foaling at which time birth weight, live status of the foal and milk ejection by the mother were recorded. Milk ejection was determined by expressing three to four streams of milk from a nipple. Gestation and birth weight data were analyzed by analysis of variance and by Bartlett's test for heterogeneity of variance. The frequency of live birth and proportion of placentas expelled were analyzed by chi-square (Snedecor and Cochran, 1967).

RESULTS AND DISCUSSION

Parturition has been induced in large saddle type mares after 320 days of gestation by multiple intramuscular injections of the glucocorticoid dexamethasone (Alm et al., 1974, 1975); progesterone (Alm et al., 1975); multiple injections of prostaglandin F\(_2\)\(_{2a}\) (J. W. Lauderdale, personal communication), or in combination with a glucocorticoid (Alm et al., 1975; Van Niekerk, 1976); or by a single injection of an analogue of prostaglandin F\(_2\)\(_{2a}\), Fluprostenol (Rossdale et al., 1976). After evidence of cervical dilation, parturition can also be induced with a single injection of oxytocin (Hillman, 1975).

The results of Experiment I indicate that parturition is effectively induced in pony mares by dexamethasone. The duration of gestation was shortened and its variance reduced by dexamethasone treatment of intact pony mares on days 321 to 324 (table 1, 324 ± .1 vs 334.4 ± 1.2, P<.01). Four of the five mares treated with dexamethasone received 3 rather than 4 days of treatment because they foaled before the fourth scheduled administration of glucocorticoid. All 12 mares studied produced and weaned live foals. There was no evidence of retained placentas the day following parturition. The fact that parturition was induced 3 days after the first injection of dexamethasone rather than 6 to 7 days as in large mares (Alm et al., 1975) suggests that pony mares require a smaller total dose of dexamethasone than large saddle type mares. Parturition after 3 days of a 4 day scheduled treatment regime suggests that pony mares may require no more than 3 days of dexamethasone treatment for the induction of parturition.

The dose and duration of glucocorticoid treatment are critical if parturition is to be

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\(^5\)Azium: 2 mg dexamethasone/ml in a vehicle of polyethylene glycol and benzyl alcohol, Schering Corporation, Bloomfield, NJ.
induced. Single injections of up to 80 mg of dexamethasone or multiple injections of 40 mg for 4 days have failed to induce parturition (Campbell, 1971; Drost, 1972; Burns, 1973). In a preliminary experiment (C. Alm, unpublished) 400 mg of dexamethasone on a single day or 200 mg on each of 2 days was ineffective in large saddle type mares.

In Experiment II two ovariectomized mares assigned to the control group foaled on days 305 and 317 before the beginning of treatment. The data were analyzed with these two mares included and excluded. The outcome was the same. Bartlett's test revealed that the variance in length of gestation was reduced by dexamethasone treatment (table 2).

In Experiment II the reduced variance in length of gestation after dexamethasone treatment of ovariectomized mares was taken as evidence that the mechanism by which dexamethasone causes premature parturition does not involve the ovaries. The short gestation period for this sample of mares prevented absolute resolution of this question. A normal gestation for Shetland type pony mares is approximately that of the control mares in Experiment I, X 334.4, range 322 to 344 days. The short gestation of the control mares in Experiment II, X 323.6, range 305 to 338 days may be due to the fact that all were ovariectomized. Gestation is known to be shortened by late ovariectomy in cattle (Estergreen et al., 1967) or hemiovariectomy in rabbits (Chiboka, 1976). However, Holtan et al. (1975), using pooled data which included the ovariectomized mares of Experiment II, were unable to show an effect of ovariectomy on length of gestation.

In Experiment II there was no significant difference between control and treated mares in birth weight, the presence of milk after parturition or the frequency of live birth (table 2). Two foals were born dead in the control group and one from a mare treated with dexamethasone. Of these, one foal from each group was delivered within an intact amnion.

There was no evidence from Experiments I and II of dystocia or an increased frequency of stillbirth after dexamethasone treatment as reported by Rossdale and Jeffcott (1975). Likewise, from Experiment II milk ejection and birth weight were unaffected by dexamethasone treatment. Alm et al. (1974) found that foals born 12 days premature after induction of parturition by dexamethasone were lighter than controls at birth and lighter through 13 weeks of age. It is likely that the similar birth weight in both groups of Experiment II was due to the small differences in mean gestational age of the foals at birth.

**LITERATURE CITED**


